L Numbe:	r Hits		DB	Time stamp
	421	karrer.in.	USPAT;	2002/10/31 08:0
			US-PGPUB;	
		·	EPO; JPO;	
			DERWENT;	
	56	karrer.in. and silicone	IBM_TDB	
		marror: and silicone	USPAT;	2002/10/24 15:3
			US-PGPUB;	
			EPO; JPO;	
			DERWENT;	*
	0	(karrer.in. and silicone) and mignana	IBM_TDB	
		(and silicone, and mighana	USPAT;	2002/10/24 15:3
			US-PGPUB;	
			EPO; JPO;	
			DERWENT;	
-	15	(karrer.in. and silicone) and mignani	IBM_TDB	
		(warranting and silicone) and mighani	USPAT;	2002/10/24 15:3
			US-PGPUB;	İ
			EPO; JPO;	J
			DERWENT;	
-	27210	hindered adj amine adj light adj	IBM_TDB	
		stabilizer or hals	USPAT;	2003/04/07 10:13
		Stabilizer of mais	US-PGPUB;	
			EPO; JPO;	
			DERWENT;	
	313111	silicone or polysiloxane or	IBM_TDB	
		polyorganosiloxane or polydiorganosiloxane	USPAT;	2002/10/31 08:10
		or organopolysiloxane or organosiloxane or	US-PGPUB;	
		diorganopolysiloxane or siloxane or	EPO; JPO;	
		organosilicone	DERWENT;	
	2606	(hindered adj amine adj light adj	IBM_TDB	
	2000	stabilizer or bala) and (sil	USPAT;	2002/10/24 15:5
		stabilizer or hals) and (silicone or	US-PGPUB;	
		polysiloxane or polyorganosiloxane or	EPO; JPO;	
		polydiorganosiloxane or organopolysiloxane	DERWENT;	
		or organosiloxane or diorganopolysiloxane or siloxane or organosilicone)	IBM_TDB	
	914	organohydrogen adj siloxane or		
	1 311	organohydrogen adj siloxane or organohydrogensiloxane	USPAT;	2002/10/24 15:57
	1	organonydrogensiroxane	US-PGPUB;	
			EPO; JPO;	
			DERWENT;	
	1782	vinyl adj siloxane or vinylsiloxane	IBM_TDB	
	1,02	vinyi adj siloxane or vinyisiloxane	USPAT;	2002/10/29 16:07
			US-PGPUB;	
			EPO; JPO;	
			DERWENT;	
	1	(hindored add aming and as as	IBM_TDB	
	-	((hindered adj amine adj light adj stabilizer or hals) and (silicone or	USPAT;	2002/10/24 15:58
	ĺ	polygilovano or malayana (Silicone or	US-PGPUB;	
	1	polysiloxane or polyorganosiloxane or	EPO; JPO;	
		polydiorganosiloxane or organopolysiloxane	DERWENT;	1
		or organosiloxane or diorganopolysiloxane	IBM_TDB	
		or siloxane or organosilicone)) and		
		(organohydrogen adj siloxane or		
		organohydrogensiloxane) and (vinyl adj		
	313111	siloxane or vinylsiloxane)		
		silicone or polysiloxane or	USPAT;	2003/04/08 07:55
	1	polyorganosiloxane or polydiorganosiloxane	US-PGPUB;	
		or organopolysiloxane or organosiloxane or	EPO; JPO;	
		diorganopolysiloxane or siloxane or	DERWENT;	•
	914	organosilicone	IBM_TDB	
	914	organohydrogen adj siloxane or	USPĀT;	2002/10/29 16:07
		organohydrogensiloxane	US-PGPUB;	
			EPO; JPO;	
			DERWENT;	
	1500		IBM TDB	
	1782	vinyl adj siloxane or vinylsiloxane	USPAT;	2002/10/28 08:23
			US-PGPUB;	
]			EPO; JPO: 1	-
			EPO; JPO; DERWENT;	*

-	140	1 (and an analysis of the state	USPAT;	2002/10/20 00 00
1		organohydrogensiloxane) and (vinyl adi	US-PGPUB;	2002/10/28 08:23
		siloxane or vinylsiloxane)	EPO; JPO;	
			DERWENT;	
			IBM TDB	
_	27210	hindered adj amine adj light adj	USPAT;	3003/04/00 07 55
		stabilizer or hals	US-PGPUB;	2003/04/08 07:55
	İ		EPO; JPO;	i
			DERWENT;	
			IBM TDB	
_	1		USPAT;	2002/10/28 08:27
		organohydrogensiloxane) and (vinyl adi	US-PGPUB;	2002/10/28 08:2/
		Siloxane or vinvlsiloxane)) and (hindered	EDO. TDO.	
		adj amine adj light adj stabilizer or hals	DERWENT;	
_	2606	1)	IBM TDB	
	2000	1 (Or DOIASTIONALE UL	I DODAM.	2002/10/28 08:27
		polyorganosiloxane or polydiorganosiloxane	TIC DODGE.	1102/10/20 00:27
		or organopolysiloxane or organosilovane or	EPO; JPO;	
		diorganopolysiloxane or siloxane or	DERWENT;	
		organosilicone) and (hindered adj amine	IBM TDB]
_	1	adj light adj stabilizer or hals)	_	
	1		USPAT;	2002/10/28 08:28
		polyorganosiloxane or polydiorganosiloxane		1 2 2 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3
		or organopolysiloxane or organosiloxane or	EPO; JPO;	
		diorganopolysiloxane or siloxane or	DERWENT;	
	İ	organosilicone) and (hindered adj amine	IBM_TDB	
	1	adj light adj stabilizer or hals)) and ((organohydrogen adj siloxane or		
		Organohydrogonsilovana)		
		organohydrogensiloxane) and (vinyl adj siloxane or vinylsiloxane))		
-	27234	hindered adj amine adj light adj		
		stabilizer or hals	USPAT;	2002/10/29 15:30
		oddfiller of hars	US-PGPUB;	
			EPO; JPO;	
	}		DERWENT;	
-	313338	silicone or polysiloxane or	IBM_TDB	
		polyorganosiloxane or polydiorganosiloxane	USPAT;	2002/10/29 15:30
		or organopolysiloxane or organosiloxane or	US-PGPUB;	•
		diorganopolysiloxane or siloxane or	EPO; JPO;	
		organosilicone	DERWENT;	
-	17793	(unsaturated or vinvl or allyl or olofin)	IBM_TDB	
]	nears (Silicone or polysilogane or	USPAT;	2002/10/30 08:21
		polyorganosiloxane or polydiorganosiloxano	US-PGPUB; EPO; JPO;	
	ĺ	or organopolysiloxane or organosiloyane or	DERWENT;	
		diorganopolysiloxane or siloxane or		
		organosilicone)	IBM_TDB	
	234	(hindered adj amine adj light adj	USPAT;	2002/10/20 15 ==
	1	stabilizer or hals) and ((unsaturated or	US-PGPUB;	2002/10/29 15:57
	i	VINYI OF allyl or olefin) nears (cilicana	EPO; JPO;	.
	į	or polysiloxane or polyorganosilovano or	DERWENT;]
	1	polydiordanosiloxane or organopolygiloxana	IBM TDB	
	1	or organosiloxane or diorganopolygiloxano	1311_100	
1		or Siloxane or organosilicone))		1
	0	alternating adj cyclic adj hydrocarbon adj	USPAT;	2002/10/29 15:57
		residue adj nydrocarbon adj	US-PGPUB;	2002/10/29 15:5/
ĺ			EPO; JPO;	1
			DERWENT;	
}	1704		IBM TDB	1
	1784	vinyl adj siloxane or vinylsiloxane	USPAT;	2002/10/29 16:07
	1		US-PGPUB;	-002/10/23 10:0/
	1		EPO; JPO;	
1			DERWENT;	
-	014		IBM TDB	
	914	organohydrogen adj siloxane or	USPAT;	2002/10/29 16:07
	(organohydrogensiloxane	US-PGPUB;	
			EPO; JPO;	
			DERWENT;	
1			IBM TDB	

_	(((hindered adj amine adj light adj	USPAT;	2002/10/29 16:0
		stabilizer or hals) and ((unsaturated or		
		vinyl or allyl or olefin) near5 (silicone	EPO; JPO;	
		or polysiloxane or polyorganosiloxane or	DERWENT;	
	1	polydiorganosiloxane or organopolysiloxane	IBM TDB	
		or organosiloxane or diorganopolysiloxane	_	·
		or siloxane or organosilicone))) and		
		(vinyl adj siloxane or vinylsiloxane) and		
		(Organonydrogen adi siloxane or		
_		organohydrogensiloxane)		
	, c	1 (Manage ed ad allithe ad 11 ant ad	USPAT;	2002/10/29 16:08
		Stabilizer or hals and ((unsaturated or	US-PGPUB;	2002/10/29 10:00
		VINYI Or allyl or olefin) near5 (silicono	EPO; JPO;	
		or polysiloxane or polyorganosilovano or	DERWENT;	1
		Polydiorganosiloxane or organopolysiloxano	IBM TDB	4
		or organosiloxane or diorganopolysiloyane		,
		Of Siloxane or organosilicone 111 and		
		(organohydrogen adi siloxane or		
	1	organohydrogensiloxane)		
_	0	((hindered adj amine adj light adj	USPAT;	3002/10/20 16 22
		Stabilizer or hals) and ((unsaturated or	US-PGPUB;	2002/10/29 16:08
		VINYI Or allyl or olefin) near5 (silicono	EPO; JPO;	Í
		or polysiloxane or polyorganosiloyane or	DERWENT;	
		Polydlorganosiloxane or organopolygiloxane		
		Of Organosiloxane or diorganopolysilovano	IBM_TDB	
		Of Siloxane or organosilicone 111 and		
		(organonydrogen adi siloxane or		
		Organohydrogensilovane \		İ
-	313338	silicone or polysiloxane or		
	ĺ	polyorganosiloxane or polydiorganosiloxane	USPAT;	2002/10/30 08:19
		or organopolysiloxane or organosiloxane or	US-PGPUB;	
		diorganopolysiloxane or siloxane or	EPO; JPO;	
		organosilicone	DERWENT;	
_	27234	hindered adj amine adj light adj	IBM_TDB	
		stabilizer or hals	USPAT;	2002/10/30 08:19
	ļ	Transfer of half	US-PGPUB;	
			EPO; JPO;	
	1		DERWENT;	
_	10655	(hydrogen or 4 or bade)	IBM_TDB	
	1	(hydrogen or H or hydride) near5 (silicone	USPĀT;	2002/10/30 08:20
		or polysiloxane or polyorganosiloxane or	US-PGPUB;	
		polydiorganosiloxane or organopolysiloxane	EPO; JPO;	1
		or organosiloxane or diorganopolysiloxane	DERWENT;	
_	11134	or siloxane or organosilicone)	IBM TDB	
	11134	(hydrogen or H or hydride or	USPĀT;	2002/10/30 08:21
	1	organohydrogen or organohydrogensiloxane)	US-PGPUB;	,,
		meald (Silicone or polysiloxane or	EPO; JPO;	
		polyorganosiloxane or polydiorganosiloxane	DERWENT;	
		or organopolysiloxane or organosiloyano om	IBM_TDB	
		ulorganopolysiloxane or siloxane or		
	17700	organosilicone)		
	17793	(unsaturated or vinyl or allyl or olefin)	USPAT;	2002/10/20 00 00
ı		nears (Silicone or polysiloxane or	US-PGPUB;	2002/10/30 08:23
		Polyorganosiloxane or polydiorganosiloyana	EPO; JPO;	
		or organopolysiloxane or organosilovano or	DERWENT;	
ĺ	[]	diorganopolySiloxane or siloxane or		
i	1	organosilicone)	IBM_TDB	
}	3893	((hydrogen or H or hydride or	IICDAM .	0000/10/
	ŀ	organohydrogen or organohydrogensilovanol	USPAT;	2002/10/30 08:23
		media (Silicone or polysilovane or	US-PGPUB;	
		DOLVOrganosilovano om malauta	EPO; JPO;	
1	ł		DERWENT;	
1	1	diorganopolysiloxane or siloxane or	IBM_TDB	
	1	organosilicone)) and //	Í	
	1	organosilicone)) and ((unsaturated or	ľ	
	}	vinyl or allyl or olefin) near5 (silicone	1	
		Of POLYSILOXADE or polyorganosiloyano on		
	1	polydlorganosiloxane or organopolygilogano		
	í	of Organosiloxane or diorganopolysilovano		
		or siloxane or organosilicone))		1

	1	The state of the s	USPAT;	2002/10/20 00 0
		Stabilizer or hals) and ((hydrogen or u	USPAT; US-PGPUB;	2002/10/30 08:24
	l	or hydride or organohydrogen or		į.
		organohydrogensiloxane) near5 (silicone or	EPO; JPO;	
		polysiloxane or polyorganosiloxane or		
	İ	polydiorganosiloxane or organopolysiloxane	IBM_TDB	
	1	or organosilovano on diamento di organopolysiloxane		
		or organosiloxane or diorganopolysiloxane	1	
	f	or siloxane or organosilicone)) and		
		((unsaturated or vinyl or allyl or olefin)	1	1
		nears (Silicone or polysilogane or		
	İ	polyorganosiloxane or polydiorganosiloxane		
	l.	or organopolysiloxane or organosilovano or		I
		diorganopolysiloxane or siloxane or		
		organosilicone)))		
	8	((hindered add amine add light add	II CD A M	0000 400 40
		stabilizer or hals) and (((hydrogen or H	USPAT;	2002/10/30 09:06
		or hydride or organohydrogen or	US-PGPUB;	
		organohydrogen or	EPO; JPO;	
i		organohydrogensiloxane) near5 (silicone or	DERWENT;	
i		polysiloxane or polyorganosiloxane or	IBM TDB	
		polydiorganosiloxane or organopolysiloxane	_	
1		Of Organosiloxane or diorganopolysiloyana		
İ		Of Siloxane or Organosilicone () and		
		((unsaturated or vinvl or allyl or olofin)	•	
		lieard (Silicone or polysilovano or		
1		polyorganosiloxane or polydiorganosiloyana		
1		or organopolysiloxane or organosiloxane or		
ĺ		diorganopolysiloxane or siloxane or		
ĺ		organosilicone)))) and filler		
	0	((hindered add and aller	1	
	J	1 (\landored ad amilie ad light add	USPAT;	2002/10/30 08:25
ļ		stabilizer or hals) and (((hydrogen or H	US-PGPUB;]
		of Hydride or organohydrogen or	EPO; JPO;	
		organohydrogensiloxane) near5 (silicone or	DERWENT;	
1		Polysiloxane or polyorganosilovano or	IBM TDB	1
-		Polydiordanosiloxane or organopolygilowana	TDM_TDB	
ĺ		Of Organosiloxane or diorganopolygiloxane		
		or siloxane or organosilicone)) and		1
-		((unsaturated or vinyl or allyl or olefin)		
		near5 (silicone or polysiloxane or		1
		polyorganogilarens polysiloxane or		
1		polyorganosiloxane or polydiorganosiloxane		}
ľ		Of Organopolysiloxane or organosilovano om i		
		diorganopolysiloxane or siloyane or		
1		organosilicone)))) and filler) and light		
		adj bulb		
	12667	"16" and light adj bulb	HODAM	
		,	USPAT;	2002/10/30 08:25
1			US-PGPUB;	
			EPO; JPO;	
i			DERWENT;	
1	0	//h in January 1	IBM TDB	
	U	((hindered adj amine adj light adj	USPAT;	2002/10/30 08:25
-		Stabilizer or hals) and ((hydrogen em u	US-PGPUB;	2002/10/30 08:25
	1	or injurite or organohydrogen or		
ĺ	i	organonydrogensiloxane) near5 (silicono am	EPO; JPO;	
i	1		DERWENT;	
	1	polydiorganosilovano om ammana i	IBM_TDB	
	į	polydiorganosiloxane or organopolysiloxane		ĺ
		or organosiloxane or diorganopolysiloxane		
	ĺ	or siloxane or organosilicone () and		
		((unsaturated or vinv) or allyl or olotin)		,
		nearb (silicone or polygilous	1	
		torrection of polysiloxane or	í	į.
	ļ	near5 (silicone or polysiloxane or polyorganosiloxane or polydiorganosiloxane		
		or organopolysiloxane or polydiorganosiloxane		
		polyorganosiloxane or polydiorganosiloxane or organopolysiloxane or organosiloxane or diorganopolysiloxane or siloxane or		

		8 (((hindered adj amine adj light adj stabilizer or hals) and ((hydrogen or H	USPAT;	2002/10/30 10:5
	ļ	or hydride or organohydrogen or		
		organohydrogensiloxane) near5 (silicone o	EPO; JPO;	
		Polysiloxane or polyorganosilovano or	TDM TDD	
		polydiorganosiloxane or organopolysiloxane	IBM_TDB	i
	İ	or organosiloxane or diorganopolysiloxane	9	
		or siloxane or organosilicone)) and		
		((unsaturated or vinyl or allyl or olefin)		
		near5 (silicone or polysiloxane or	'	
		polyorganosiloxane or polydiorganosiloxane		
		or organopolysiloxane or organosiloxane or)	
		diorganopolysiloxane or siloxane or	3	
		organosilicone)))) or (((hindered adj		
		amine adj light adj stabilizer or hals)		į
		and (((hydrogen or H or hydride or		
	ĺ	organohydrogen or organohydrogensilovana)		İ
		near5 (silicone or polysiloxane or		
		polyorganosiloxane or polydiorganosiloxane		
		or organopolysiloxane or organosilowane and		
		diorganopolysiloxane or siloxane or		
		organosilicone)) and ((unsaturated or		
		VINVI Or allyl or olefin) nears (giliage		
		or polysiloxane or polyorganosilovano or		
		polydiorganosiloxane or organopolysiloxane		
	İ	or digdhosiloxane or diorganopolygiloxano		
	ĺ	or Siloxane or organosilicone 1111 and	1	
		filler)) not (((hindered adj amine adj		
		11ght ad Stabilizer or hals \ and		
		(((hydrogen or H or hydride or		
		organohydrogen or organohydrogensilovano		
		liteato (Sillcone or polysilovane or		
		Polyorganosiloxane or polydiorganosiloyana		
		1 or organopolysiloxane or organosiloxane am		1
	į	diolydnopolysiloxane or siloxane or		
		organosilicone)) and ((unsaturated or		
		VINYI Or allyl or olefin) near5 (gilicons		
		or polysiloxane or polyorganosiloyana an		
		Polydiorganosiloxane or organopolygiloxane		
		Of Organositoxane or diorganopolygilovana		
		of Siloxane or organosilicone)))) and:		
	00100	TITET)		
-	83103	general adj electric	IICDAT.	2000/10/00
			USPAT; US-PGPUB;	2002/10/30 10:52
			EPO; JPO;	
			DERWENT;	
•	313338	silicone or polysiloxane or	IBM_TDB	0000 /5 : /=:
	1	Polyorganosiloxane or polydiorganosiloxane	USPAT;	2003/04/07 10:13
		Or OrganopolySiloxane or organosilovano a	US-PGPUB; EPO; JPO;	
		diorganopolysiloxane or siloxane or	DERWENT;	
		Organosilicone		
	12045	(general adj electric) and (silicons and	IBM_TDB	2000/10/55
		Polysiloxane or polyorganosilovano on	USPAT;	2002/10/30 10:53
		polydlorganosiloxane or organopolysiloxana	US-PGPUB;	
	ĺ	Of Organosiloxane or diorganopolygilowana	EPO; JPO; DERWENT;	
		Or Siloxane or organosilicone)		
	27234	nindered adj amine adj light adj	IBM_TDB	2000/10/55
		stabilizer or hals	USPAT;	2002/10/30 10:53
			US-PGPUB;	
			EPO; JPO;	
	1		DERWENT;	
	155	((general adj electric) and (silicone or	IBM_TDB	2000/12/
	1	Polysiloxalle or polyorganosilovano on	USPAT;	2002/10/30 10:54
		Polydiordanosiloxane or organopolygilowana	US-PGPUB;	
		of Organosiloxane or diorganopolysiloyana	EPO; JPO;	
		or strokage or organosilicone () and	DERWENT;	
		(nindered ad) amine adi light adi	IBM_TDB	}
		stabilizer or hals)		

_	1854	(524/96 252/502 252/502 252/502		
	1054	(524/86 252/582 252/588 252/589).ccls.	USPAT;	2002/10/31 08:09
			US-PGPUB; EPO; JPO;	
			DERWENT;	
			IBM TDB	
<u> </u>	313722		IICDAT.	2002/10/31 08:10
		polyorganosiloxane or polydiorganosiloxane	US-PGPUB;	, , , , , , ,
		or organopolysiloxane or organosiloxane or		
	}	diorganopolysiloxane or siloxane or organosilicone	DERWENT;	ļ
_	27246	hindered adj amine adj light adj	IBM_TDB	
		stabilizer or hals	USPAT; US-PGPUB;	2002/10/31 08:10
			EPO; JPO;	
			DERWENT;	
_	6	//504/06 050/500 050/500	IBM TDB	
	6	1 ((****) ** ***************************	USPAT;	2002/10/31 08:16
		and (silicone or polysiloxane or	US-PGPUB;	
		polyorganosiloxane or polydiorganosiloxane or organopolysiloxane or organosiloxane or		
		diorganopolysiloxane or siloxane or	DERWENT;	
	Ì	organosilicone) and (hindered adj amine	IBM_TDB	
		ad] light adi stabilizer or hals)		
-	39	"4421823"	USPAT;	2002/10/31 08:17
			US-PGPUB;	
			EPO; JPO;	
			DERWENT;	
-	1	"4421823" and polysiloxane	IBM_TDB USPAT;	2002/10/21 02 15
		1 - 2	US-PGPUB;	2002/10/31 08:16
			EPO; JPO;	
			DERWENT;	
~	1	"04421823"	IBM_TDB	
	_	04421023	USPAT;	2002/10/31 08:17
			US-PGPUB;	
i			EPO; JPO; DERWENT;	
			IBM TDB	
_	j 1	de-4421823-\$.did.	USPAT;	2002/10/31 08:18
			US-PGPUB;	=112, 13, 31 33.13
			EPO; JPO;	
			DERWENT;	
-	328166	silicone or polysiloxane or	IBM_TDB USPAT:	2002/04/07 10 17
		polyorganosiloxane or polydiorganosiloxane	US-PGPUB;	2003/04/07 10:17
		or organopolysiloxane or organosiloxane or	EPO; JPO;	
	ļ	diorganopolysiloxane or siloxane or	DERWENT;	
_	28130	organosilicone hindered adj amine adj light adj	IBM_TDB	1
İ	20100	stabilizer or hals	USPAT;	2003/04/07 10:13
İ			US-PGPUB; EPO; JPO;	
			DERWENT;	1
_			IBM TDB	
-	0	alternating adj cyclic adj hydrocarbon adj	USPAT;	2003/04/07 10:25
		residue	US-PGPUB;	1
	ļ		EPO; JPO;	
	1		DERWENT;	}
-	2826	(silicone or polysiloxane or	IBM_TDB USPAT;	2002/04/05 55
		polyorganosiloxane or polydiorganosiloxane	US-PGPUB;	2003/04/07 10:16
	}	or organopolysiloxane or organosiloxane or	EPO; JPO;	
		diorganopolysiloxane or siloxane or	DERWENT;	
		organosilicone) and (hindered adj amine	IBM_TDB	
	73480	adj light adj stabilizer or hals) polysiloxane or polyorganosiloxane or		
-		polydiorganosiloxane or organopolysiloxane	USPAT;	2003/04/07 10:18
		or organosiloxane or diorganopolysiloxane	US-PGPUB; EPO; JPO;	
		2 1 1 2	DERWENT;	
			IBM TDB	

_	66	(polysiloxane or polyorganosiloxane or polydiorganosiloxane or organopolysiloxane	USPAT;	2003/04/07 10:1
		or organosiloxane or diorganopolysiloxano		
		/ Same (nindered adj amine adj light adj	EPO; JPO; DERWENT;	
_		Stabilizer or hals)	IBM TDB	
_	282	1 (Or DOTASTICKAND U.	II C D A M	2003/04/07 10:1
		polyorganosiloxane or polydiorganosiloxane	IIG BORES	2003/04/07 10:1
		1 or organopolysiloxane or organosilovano or	EPO; JPO;	
		diorganopolysiloxane or siloxane or	DERWENT;	
		organosilicone) same (hindered adj amine adj light adj stabilizer or hals)	IBM_TDB	
-	293	(polycyclic or cyclic) adj hydrocarbon adj		
		residue		2003/04/07 10:2
			US-PGPUB;	
			EPO; JPO; DERWENT;	
_	0000		IBM_TDB	
-	2838	((silicone or polysiloxane or	LICIDAM	2003/04/07 10:20
		Polyorganosiloxane or polydiorganosiloyana	IIG DODIED	2003/04/07 10:26
		Of OrganopolySiloxane or organosiloyana an	EPO; JPO;	
		didiganopolysiloxane or siloyane or	DERWENT;	
	i i	organosilicone) and (hindered adj amine	IBM_TDB	
_	2823	adj light adj stabilizer or hals)) not8 ((silicone or polysiloxane or	_	
		polyorganosiloxane or polydiorganosiloxane	USPAT;	2003/04/07 10:26
		or organopolysiloxane or organosiloxane or		
		uldiganopolysiloxane or siloxane or		
		organosilicone) and (hindered add amine	DERWENT;	ł
		auj light ad] Stabilizer or hals)) not	IBM_TDB	
		((POLYCYCLIC OF CVClic) add hydrogarbon		
		adj residue)		
	3	((silicone or polysiloxane or	USPAT;	2003/04/07 10:27
]	polyorganosiloxane or polydiorganosiloxane	US-PGPUB;	2003/04/07 10:27
		or organopolysiloxane or organosilovana am	EPO; JPO;	
	}	diolydnopolysiloxane or siloyane or	DERWENT;	
		organosilicone) and (hindered adj amine	IBM_TDB	
		adj light adj stabilizer or hals)) and ((polycyclic or cyclic) adj hydrocarbon	_	
		adj residue)		1
	11	(((silicone or polysiloxane or	TIOD TO	
		polyorganosiloxane or polydiorganosiloxane	USPAT;	2003/04/07 10:28
		or organopolysiloxane or organosilovano or	US-PGPUB; EPO; JPO;	
	1	uldiganopolysiloxane or siloyane or	DERWENT;	
}		organosilicone) and (hindered add amina	IBM_TDB	
	1	aul liule aul Stabilizer or bala 11		
		(Polycyclic or cyclic) add hydrogarhan		
	1	adj residue// alla liant and hills		
	00	(polysiloxane or polyorganosiloxane or	USPAT;	2003/04/07 10:29
		polydiorganosiloxane or organopolysiloxane or organosiloxane or diorganopolysiloxane	US-PGPUB;	
) same (hindered adj amine adj light adj	EPO; JPO;	
	ļ.	stabilizer or hals)	DERWENT;	
	0	((polysiloxane or polyorganosiloyane on	IBM TDB	000045
	l i	Polydlorganosiloxane or organopologilo	USPĀT;	2003/04/07 10:28
-	(or digamosiloxane or diorganopolysiloyano	US-PGPUB; EPO; JPO;	
		/ Same (Mildered add amine add light add)	DERWENT;	
	054	ocapitizer or hals)) and light and bulk	IBM TDB	
	054	(Polysiloxane or polyorganosilovano on	USPAT;	2003/04/07 10:29
	1.1	polydiordanosiloxane or organopolygilowana	US-PGPUB;	2003/04/07 10:29
	-	or diorganopolygilows !	EPO; JPO;	
1) and (hindered adj amine adj light adj	DERWENT;	
	2	capilizer or nais)	IBM_TDB	
1	מו	(polysiloxane or polyorganosiloxane or polydiorganosiloxane or organopolysiloxane	USPAT;	2003/04/07 10:36
	0		US-PGPUB;	
	-		EPO; JPO;	
	5	tabilizer or hals)) and light add hold	DERWENT;	
	- (non-cyclic or noncyclic) near5	IBM TDB	0000 (5.1)
	v	100161100000	USPAT;	2003/04/07 10:37
1		1	US-PGPUB; EPO; JPO;	
			DERWENT;	
	1			

	1	(""" of cite of noncyclic) hear()	USPAT;	2003/04/07 10:3
		vinylsiloxane	US-PGPUB;	2003/04/07 10:3
			EPO; JPO;	
			DERWENT;	Í
			IBM TDB	
-	1129	vinylsiloxane	USPAT;	2003/04/07 10 20
			US-PGPUB;	2003/04/07 10:39
			EPO; JPO;	
			DERWENT:	
			IBM TDB	İ
_	957			0000 40 4 45
		organohydrogensiloxane)	USPAT;	2003/04/07 10:39
		,	US-PGPUB;	ļ
			EPO; JPO;	
			DERWENT;	
~	354862	filler	IBM_TDB	
			USPAT;	2003/04/07 10:40
			US-PGPUB;	
			EPO; JPO;	
			DERWENT;	
	82	vinylsiloxane and ((organohydrogen adj	IBM_TDB	
	1	siloxane or organohydrogensiloxane)) and	USPAT;	2003/04/07 10:43
	1	filler of organonydrogensiloxane)) and	US-PGPUB;	
			EPO; JPO;	
	1		DERWENT;	
_	1	(Vinvisilovane and //	IBM_TDB	
		(vinylsiloxane and ((organohydrogen adj	USPAT;	2003/04/07 10:41
		siloxane or organohydrogensiloxane)) and	US-PGPUB;	
		filler) and (hindered adj amine adj light adj stabilizer or hals)	EPO; JPO;	ļ
		adj scabilizer or hals)	DERWENT;	
- j	1058	/silicono en mal	IBM TDB	
	1000	(silicone or polysiloxane or	USPAT;	2003/04/07 10:41
İ		polyorganosiloxane or polydiorganosiloxane	US-PGPUB;	, 01, 0, 10.41
		or organopolysiloxane or organosiloxane or	EPO; JPO;	
	1	ulorganopolysiloxane or siloyano on	DERWENT;	
	108	organosilicone) and vinylsiloxane	IBM_TDB	
	108	((Silicone or polysiloxane or	USPAT;	2003/04/07 10:41
1	Í	polyorganosiloxane or polydiorganosiloxane	US-PGPUB;	2003/04/07 10:41
		or organopolysiloxane or organosilovano on	EPO; JPO;	J.
}		diorydnopolysiloxane or siloyano or	DERWENT;	
		organosilicone) and vinvisilovane) and	IBM TDB	
		(torganonydrogen adi siloxane or	1011_100	
	_	organohydrogensiloxane))		
	1	(((silicone or polysiloxane or	USPAT;	2002/04/05 10
	i	polyorganosiloxane or polydiorganosilovana	ITO DODIE	2003/04/07 10:41
ĺ	- 1	or organopolysiloxane or organosilovano or	EPO; JPO;	
	i	diorganopolysiloxane or siloxane or	DERWENT;	
ĺ	1	Organosilicone) and vinvisilovano) and		
	ļ	(Organonydrogen adi siloyane or	IBM_TDB	
	ı	organonydrogensiloxane))) and (hindowed		
		adj amine adj light adj stabilizer or hals		İ
		,		
	109	vinylsiloxane and ((organohydrogen adj	Hanz	
	1	siloxane or organohydrogensiloxane))	USPAT;	2003/04/07 10:46
1		- 3	US-PGPUB;	
}			EPO; JPO;	
	ļ		DERWENT;	
1	10	vinylsiloxane adj fluid	IBM_TDB	
		rangisiiokane adj liuld	USPAT;	2003/04/07 10:46
			US-PGPUB;	1, 1, 10, 10
			EPO; JPO;	
1		1	DERWENT;	
1	2826	///***	IBM TDB	
1		(((silicone or polysiloxane or	USPAT;	2003/04/07 10:46
1	F	polyorganosiloxane or polydiorganosilowana	US-PGPUB;	2000/04/0/ 10:46
1	'	or organopolysiloxane or organosilozona /	EPO; JPO;	
İ	0	TOTY diopoly Silovane or	DERWENT;	
ſ	j c	organosilicone) and (hindered adi amine)	TEM TOT	
ĺ	l a	ul light add stabilizer or hale \\ no+o\	IBM_TDB	
1	T I	(ind to independ of nate // note)		
	l a	and (hindered adj amine adj light adj	ľ	1

		(vinylsiloxane adj fluid) and (hindered adj amine adj light adj stabilizer or hals	USPAT;	2003/04/07 10:5
)		
			EPO; JPO; DERWENT;	
_		2 5500	IBM TDB	
	() sle5700	USPAT;	2003/04/07 10:5
			US-PGPUB;	1010
			EPO; JPO;	
			DERWENT;	
_] 3	sle adj "5700"	IBM_TDB USPAT;	2002/04/07 10 5
	1		US-PGPUB;	2003/04/07 10:5
			EPO; JPO;	
	Ĭ		DERWENT;	
-	0	(sle adj "5700") and (hindered adj amine	IBM_TDB	
		adj light adj stabilizer or hals)	USPAT;	2003/04/07 11:0
		J J J J J J J J J J J J J J J J J J J	US-PGPUB;	
			EPO; JPO; DERWENT;	
_	26014		IBM TDB	
	26914		USPAT;	2003/04/07 11:24
	ļ	unsaturat\$3) near10 (silicone or polysiloxane or polyorganosiloxane or	US-PGPUB;	, 0 , 11.2.
		polydiorganosiloxane or organopolysiloxane	EPO; JPO;	
	İ	or organosiloxane or diorganonolysilovano	'	
		or Siloxane or organosilicone)	IBM_TDB	
_	392	((Vinyl or allyl or olefins? or	USPAT;	2003/04/07 11:22
		unsaturat\$3) near10 (silicone or	US-PGPUB;	2003/04/07 11:22
		polysiloxane or polyorganosiloxane or	EPO; JPO;	
		polydiorganosiloxane or organopolysiloxane or organosiloxane or diorganopolysiloxane	DERWENT;	
		or siloxane or organosilicone)) and	IBM_TDB	
		(nindered add amine add light add		
_		Stabilizer or hals)		
	0	1 () () The state of the stat	USPAT;	2003/04/07 11:01
		unsaturat\$3) near10 (silicone or	US-PGPUB;	2000/04/07 11:01
	Í	polygiloxane or polygranosiloxane or	EPO; JPO;	
	ļ	polydiorganosiloxane or organopolysiloxane or organosiloxane or diorganopolysiloxane	DERWENT;	
		Of Siloxane or organosilicone () and	IBM_TDB	
		(nindered ad) amine adi light adi		
		stabilizer or hals)) and ((organohydrogon		
	272	au Siloxane or organohydrogensilovano)		1
	212	\\\VINVL Or allv or olefine? or	USPAT;	2003/04/07 11:22
		unsaturat\$3) near10 (silicone or polysiloxane or polyorganosiloxane or	US-PGPUB;	
		Polydlorganosiloxane or organopolygiloxana	EPO; JPO;	
		or organosiloxane or diorganopolygiloxana	DERWENT;	
		of Siloxane or organosilicone 11 and	IBM_TDB	
		(nindered adj amine adj light adj		
	216	Stabilizer or hals)) and filler		
	210	((((vinyl or allyl or olefin\$2 or unsaturat\$3) near10 (silicone or	USPAT;	2003/04/07 11:23
		polysiloxane or polyorganosiloxane or	US-PGPUB;	==120
		polydlorganosiloxane or organopolygiloxano	EPO; JPO;	
		of Organosiloxane or diorganopolysiloyano	DERWENT;	
		or siloxane or organosilicone 11 and	IBM_TDB	
		(nindered ad) amine adi light adi		
		stabilizer or hals)) and filler) and crosslink\$3	1	
	13334	Crossink\$3		
	10004	(vinyl or allyl or olefin\$2 or unsaturat\$3) near3 (silicone or	USPAT;	2003/04/07 11:24
		DOLUSI LOVADO ON MAILERA	US-PGPUB;	
	1 1	polydlorganosiloxane or organopolygiloxana	EPO; JPO;	
	1	of Organosiloxane or diorganopolysiloxano	DERWENT; IBM TDB	
		or siloxane or organosilicone)		

	105	1 , , , =	USPAT;	2003/04/07 11:2
1		unsaturat\$3) near3 (silicone or	US-PGPUB;	
		polysiloxane or polyorganosiloxane or	EPO; JPO;	
		polydiorganosiloxane or organopolysiloxane	DERWENT;	
	1	Of Organosiloxane or diorganopolysilovane	IBM TDB	
		Or Siloxane or organosilicone 11 and	_	
		(hindered adj amine adj light adj		1
_	21891	stabilizer or hals) divinyl		1
	21051	arvinyi	USPAT;	2003/04/08 07:55
1			US-PGPUB;	
1			EPO; JPO;	
1			DERWENT;	
-	328415	silicone or polysiloxane or	IBM_TDB	
		1 or or borygring Of	USPAT;	2003/04/08 08:00
		polyorganosiloxane or polydiorganosiloxane		
		or organopolysiloxane or organosiloxane or		
l	ĺ	diorganopolysiloxane or siloxane or organosilicone	DERWENT;	
-	254	divinul noom3 (-11)	IBM_TDB	
	254	1 I I MORTO (STITEONE OF DOLDO ASILONO	USPAT;	2003/04/08 07:57
		or polyorganosiloxane or	US-PGPUB;	, , , , , , , , , , , , , , , , , , , ,
	1	polydiorganosiloxane or organopolysiloxane	EPO; JPO;	
	1	of organosiloxane or diorganopolygilowane	DERWENT;	
_	28146	Or Siloxane or organosilicone	IBM TDB	
	20140	hindered adj amine adj light adj stabilizer or hals	USPAT;	2003/04/08 07:55
		Stabilizer or hals	US-PGPUB;	,,
			EPO; JPO;	
			DERWENT;	Į.
_	3	/dia-i	IBM TDB	
ĺ	3	(divinyl near3 (silicone or polysiloxane	USPAT;	2003/04/08 07:55
		or polyorganosiloxane or	US-PGPUB;	2003/04/08 07:33
		polydiorganosiloxane or organopolysiloxane	EPO; JPO;	
		or organosiloxane or diorganopolysilovano	DERWENT;	
		Of Siloxane or organosilicone 11 and	IBM TDB	
		(nindered adj amine adj light adj		
_	F 2 2	Stabilizer or hals		
	533	divinyl near10 (silicone or polysiloxane	USPAT;	2003/04/08 07:58
	i	or polyorganosiloxane or	US-PGPUB;	2003/04/08 07:58
		polydiorganosiloxane or organopolysiloxane	EPO; JPO;	
1		or organositoxane or diorganopolygilowane	DERWENT;	
_ [5	or Siloxane or Organosilicone)	IBM TDB	
	٥	(divinyl near10 (silicone or polysiloxane	USPAT;	2003/04/08 07:58
	ļ	or polyorganosiloxane or	US-PGPUB;	2003/04/08 07:58
	İ	polydiorganosiloxane or organopolysiloxane	EPO; JPO;	
		or diganositoxane or diorganopolygilowana	DERWENT;	
	1	of Siloxane or organosilicone 1) and	IBM_TDB	
ĺ		(nindered ad) amine adi light adi		
_	1055	stabilizer or hals)		
	1257	vinylsiloxane or divinylsiloxane	USPAT;	2003/04/00 00 ==
1		-	US-PGPUB;	2003/04/08 08:15
		i	EPO; JPO;	
1			DERWENT;	
_	2.5		IBM TDB	
-	840	organohydrogensiloxane	USPAT;	2002/04/00 00
İ]		US-PGPUB;	2003/04/08 08:15
			EPO; JPO;	
	ĺ		DERWENT;	
-	117	(vinylsiloxane or divinylsiloxane) and	IBM_TDB	0000/01/1
1		organohydrogensiloxane	USPAT;	2003/04/08 10:33
ļ		- 5	US-PGPUB;	
	}		EPO; JPO;	
1	1		DERWENT;	
	96	((vinylsiloxane or divinylsiloxane) and	IBM_TDB	ļ
	(USPAT;	2003/04/08 10:27
			US-PGPUB;	
}			EPO; JPO;	
			DERWENT;	
			IBM TDB	

-	8	(((vinylsiloxane or divinylsiloxane) and organohydrogensiloxane) and filler) and	USPAT;	2003/04/08 09:09
	ļ	divinyl	US-PGPUB; EPO; JPO;	
			DERWENT;	
-	0	((((vinylsiloxane or divinylsiloxane) and	IBM_TDB	
į		organohydrogensiloxane) and filler) and	USPAT;	2003/04/08 09:23
		dlvinyl) and (hindered adj amine adj light	US-PGPUB; EPO; JPO;	
		adj stabilizer or hals)	DERWENT;	
ĺ –	2829	(silicone or polysiloxane or	IBM_TDB	
		polyorganosiloxane or polydiorganosiloyane	USPAT;	2003/04/08 09:31
		or organopolysiloxane or organosiloxane or	US-PGPUB; EPO; JPO;	
		diorganopolysiloxane or siloxane or	DERWENT;	
Í	Í	organosilicone) and (hindered adj amine adj light adj stabilizer or hals)	IBM_TDB	
-	2	5350786.pn.	IIGDam.	0000/01/05
			USPAT; US-PGPUB;	2003/04/08 09:31
			EPO; JPO;	
			DERWENT;	
-	0	5350786.pn. and (silicone or polysiloxane	IBM TDB	
		or polyorganosiloxane or	USPAT; US-PGPUB;	2003/04/08 09:36
		polydiorganosiloxane or organopolysiloxano	EPO; JPO;	
		or organosiloxane or diorganopolysiloyane	DERWENT;	
-	12	or siloxane or organosilicone) ((silicone or polysiloxane or	IBM_TDB	
		polyorganosiloxane or polydiorganosilovano	USPAT; US-PGPUB;	2003/04/08 09:36
		or organopolysiloxane or organosiloxane or	EPO; JPO;	
		dlorganopolysiloxane or siloxane or	DERWENT;	
		organosilicone) and (hindered adj amine adj light adj stabilizer or hals)) and	IBM_TDB	
		(Vinyisiloxane or divinyisiloxane)		
-	7	(((Silicone or polysiloxane or	USPAT;	2003/04/08 10:10
		polyorganosiloxane or polydiorganosiloxane	US-PGPUB;	2003/04/00 10.10
		or organopolysiloxane or organosiloxane or diorganopolysiloxane or siloxane or	EPO; JPO;	
		organosilicone) and (hindered add amine	DERWENT; IBM TDB	
		[dQ] light ad] stabilizer or hals () and	IBM_IBB	
		(vinylsiloxane or divinylsiloxane)) and filler		
~	1	((vinylsiloxane or divinylsiloxane) and	HCDAM.	0000 /01 /01
		organonydrogensiloxane) and (hindered adi	USPAT; US-PGPUB;	2003/04/08 10:13
		amine adj light adj stabilizer or hals)	EPO; JPO;	
			DERWENT;	
_	0	sle5700	IBM_TDB USPAT;	0000/04/05
			US-PGPUB;	2003/04/08 10:14
			EPO; JPO;	
	1		DERWENT;	
-	3	sle adj "5700"	IBM_TDB USPAT;	2002/04/02 12 1
			US-PGPUB;	2003/04/08 10:14
			EPO; JPO;	· .
			DERWENT;	
-	50	uvasil	IBM_TDB USPAT;	2002/04/02 12 1
			US-PGPUB;	2003/04/08 10:14
			EPO; JPO;	
			DERWENT;	
-	0	q1040r	IBM_TDB USPAT;	2002/04/02 12 1
		-	US-PGPUB;	2003/04/08 10:14
		ł	EPO; JPO;	
			DERWENT;	
-	13	qadj "1040" adj r	IBM_TDB USPAT;	2002/04/00 12 1
		-	US-PGPUB;	2003/04/08 10:14
			EPO; JPO;	
			DERWENT;	
			IBM_TDB	

_	(q adj "1040" adj r	USPAT;	2003/04/08 10:15
			US-PGPUB;	2003/04/08 10:15
			EPO; JPO;	
			DERWENT; IBM TDB	
-	C	q adj "1040r"	USPAT;	2003/04/08 10:15
			US-PGPUB;	1 2 2 2 2 7 3 1 7 3 3 1 3 1 3 1 3 1 3 1
	Ì		EPO; JPO;	
			DERWENT; IBM TDB	}
-	0	(sle adj "5700") and uvasil	USPAT;	2003/04/08 10:15
			US-PGPUB;	11117 017 00 10:15
			EPO; JPO;	
			DERWENT; IBM TDB	
-	2	5013800.pn.	USPĀT;	2003/04/08 10:27
			US-PGPUB;	1 100,01,00 10.2,
			EPO; JPO;	
			DERWENT; IBM TDB	
-	2	5013800.pn. and (pt or platinum)	USPAT;	2003/04/08 10:32
			US-PGPUB;	1000,01,00 10.52
			EPO; JPO;	
			DERWENT; IBM TDB	
_	1	(((vinylsiloxane or divinylsiloxane) and	USPAT;	2003/04/08 10:32
		organohydrogensiloxane) and filler) and	US-PGPUB;	10.52
		(hindered adj amine adj light adj stabilizer or hals)	EPO; JPO;	
			DERWENT; IBM TDB	
-	1	((vinylsiloxane or divinylsiloxane) and	USPAT;	2003/04/08 10:33
		organohydrogensiloxane) and (silicone or polysiloxane or polyorganosiloxane or	US-PGPUB;	1117, 017, 00 10:55
		polydiorganosiloxane or organopolysiloxane	EPO; JPO;	
		or organosiloxane or diorganopolysiloxane	DERWENT; IBM TDB	
		or siloxane or organosilicone) and	1511_155	
		(hindered adj amine adj light adj stabilizer or hals)		
-	735006	vinyl or unsaturat\$3 or alkenyl	HCDAM.	0000/04/00 +0
			USPAT; US-PGPUB;	2003/04/08 10:34
			EPO; JPO;	
			DERWENT;	
_	18904	(vinyl or unsaturat\$3 or alkenyl) near5	IBM_TDB USPAT;	2002/04/02 10 04
		(Silicone or polysiloxane or	US-PGPUB;	2003/04/08 10:34
		polyorganosiloxane or polydiorganosiloxane	EPO; JPO;	
		or organopolysiloxane or organosiloxane or diorganopolysiloxane or siloxane or	DERWENT;	
		organosilicone)	IBM_TDB	
	223	((vinyl or unsaturat\$3 or alkenyl) near5	USPAT;	2003/04/08 10:34
		(Silicone or polysiloxane or	US-PGPUB;	2007,017,00 10.54
		polyorganosiloxane or polydiorganosiloxane or organopolysiloxane or organosiloxane or	EPO; JPO;	
		diorganopolysiloxane or siloxane or	DERWENT; IBM TDB	
		organosilicone)) and (hindered adj amine	12.1_100	
	166	ad] light adj stabilizer or hals \		
	100	(((vinyl or unsaturat\$3 or alkenyl) near5 (silicone or polysiloxane or	USPAT;	2003/04/08 11:00
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Posted on: 10/01/2001

UV Protection and Coatings for Plastics in the Automobile Industry

UV Protection and Contings for

in the Automobile Industry



Since Henry Ford launched his famous Model T, the development of automobile a engineering has experienced true quantum leaps. Because of the variety of possil safety considerations and the significant weight savings, the automotive industry i using plastic components. On average, today's car consists of 14% of various typ. The organic material is, however, subject to a natural aging process that makes the stabilizers necessary. Exposure to sunlight accelerates the process. Often, such process are treated with a topcoat. However, due to undesired migration, the of stabilizer in the plastic and coating decreases over time. The plastic, as well as then no longer sufficiently protected. This article describes the mechanism of migrations possible methods of delaying it.

Plastics

Plastics are found in the car as cable insulation, interior covering, dashboards, tanks or under the hood. Increasingly, auto body components are also being made of plastic. Some of these are uncoated or appear in the same shade as the rest of the auto body. Some pilot projects even describe auto bodies made entirely of plastic.

The material itself is subject to a natural aging process, which begins as early as

manufacture, due to extreme processing conditions that occur at times. To delay the degradation as long as possible, so-called process and long-term stabilizers are added. If the component is exposed to the elements without protection, degradation is further accelerated. In addition to the compulsory long-term stabilization, the polymer also needs an additional UV-stabilization package.

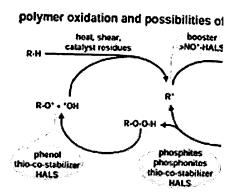


Figure 1

Figure 2

Coatings

The UV stabilization is an indispensable element of the plastic coating in the automobile exterior. In ideal circumstances, these are multi-layer systems. The coating of plastics begins with the application of a primer, which has a binding effect on the basecoat, that is then applied over the primer. Finally, a clearcoat containing the light stabilizers for UV protection seals the coating system.

This, however, exacerbates the problem of migration1: the organic substrate makes it possible for the stabilizers to

act as oxygen radical traps

radical scave

migrate into the plastic and also permits the migration of the plastic stabilizers to t of the coating. With a decrease in the concentration of UV protector in the paint st protective function of the coating, by definition, also decreases. Plastic stabilizers upwards from the substrate cause yellowing in the topcoat or, in the worst case, c to complete loss of adhesion.

Polymer Stabilizer Packages

Every stabilizer has a specific temperature range in which it develops its optimum protective effect. For this reason, a mix of different stabilizers is added to the polymers - so-called stabilizer packages. They generally consist of primary and secondary antioxidants, and ensure sufficient protection of the polymer (see Figure 1).

The most important primary antioxidants are the sterically hindered phenols. They are suitable as long-term stabilizers in almost all cases. Despite their many benefits, they have one undesirable side effect. As a result of UV radiation and subsequent photolytic degradation, they develop

visible light UV-radiation UV - absorber

Figure 3

deeply colored quinoid structures which lead to a yellowing of the plastic (see Fig.

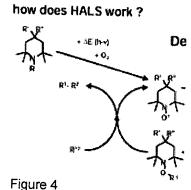
As protection against the often high temperatures during further processing, secon antioxidants such as phosphites, phosphonites or HALS are also used.

Coating Stabilizer Packages

Two groups of stabilizers have been developed for coatings and are suitable for p plastics and the coatings themselves: UV absorbers and sterically hindered amine HALS = Hindered Amine Light Stabilizers).3

UV Absorbers

Most UV absorbers function according to similar mechanisms. The physical absorption process protects both the deeper sections of the coating and the substrate from the high-energy fractions of sunlight. These are absorbed and lead to isomerization, causing the molecule to transform into an excited structure. When the molecule reverts to its original condition, the absorber releases the energy into the environment as thermal energy. The relevant UV absorbers in coatings include 2-hydroxybenzophenones, oxalanilides, 2-hydroxyphenylbenzotriazoles and 2-hydroxy-phenyltriazines.

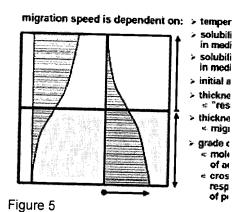


According to the Lambert-Beer Law, the absorption of a medium depends, among on the UV-absorber concentration and on the distance traveled within it by the light concentration and the thickness of the coating may, therefore, not be permitted to certain minimum limit in order to guarantee protection of the substrate through absorber the UV ray penetrates the coating, the greater the absorption or the effect absorber. Due to the very short distance the UV ray is able to travel to the immediate coating, the protective effect of the UV absorber is at its lowest at this point (so

Sterically Hindered Amines (HALS)

With UV protectors of the hindered amine light stabilizer type, stabilization results from the trapping of the intermediately developed radicals. All UV protectors of this type are based on a single chemical structure: tetramethylpiperidine. They differ only in terms of the substituents at the nitrogen atom (R) or on the opposite ring side (R' and R").

They operate as UV protectors by combining with oxygen when exposed to light to form stable nitroxide radicals. The latter trap the radicals, which have developed from the polymer through



exposure to UV rays. The most important feature of the nitroxide radicals is their r capacity. Thus, a cyclical reaction is possible, which can repeat hundreds of times HALS itself has been degraded (see Figure 4). Radical chain reactions, which attained the substrate, are thus prevented.

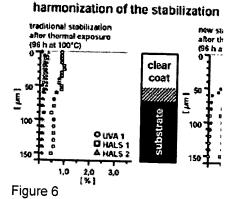
HALS, in contrast to UV absorbers, protect chemically rather than physically. Con their effectiveness depends on optimum dispersal in the binding agent. The neces of HALS is therefore based on the solids content in the binding agent.

Migration Processes

Migration is the undesired movement of the stabilizers between the coating layers and the substrate. Whether migration proceeds from the upper layer to the substrate or vice-versa -- negative effects occur in both cases. Among other things, the stabilizing properties of the coating may be lost or a degradation of the plastic may occur. The speed of migration depends on a variety of factors, including the temperature, solubility of the additives, concentration differences, the thickness of the coating or the mobility of the additive.2

While migration cannot be completely prevented, it can be effectively delayed and controlled by the following.

- Harmonization of plastics and coating stabilizers
- Use of "non-migrating" stabilizers
- Migration barriers



In principle, migration can also be reduced through the use of high molecular -- ar consequently lower mobile -- additives. The parameters of the molecular weight c however, be varied at will, as it has a simultaneous effect on the secondary prope solubility and compatibility.

Detection through Microtome Technology

The microtome technique is a modern method of tracing migration. Working from the outside, it separates coatings into thin layers thus permitting a detailed analysis of the protective layers. Depending on the hardness and brittleness of the material to be examined, suitable setting of the microtome permits sections of as little as 2 mm to be cut. In order to obtain intact and usable sections, the plastic samples are generally somewhat thicker. Subsequently the sections, which can be up to 7 x 9 cm, are placed in test tubes, mixed with an extraction agent and left in an ultrasonic bath for 10 hours. Afterwards, the

mechanism of photo-reactive i-

concentration of the additive in each individual layer can be determined by HPLC or gas-chromatographic means (HALS and UV-absorber).

Methods of Reducing Migration

Harmonization of Plastics and Coating Stabilizer

HALS stabilize both the plastic and the coating. In the protective coating, the HAL together with a suitable UV absorber as light stabilizers. In plastics, on the other h often needed for process stabilization.

Whereas it was common up to now for each manufacturer to use the stabilizer of latest studies from Clariant prove the benefit of using identical stabilizers in the proceeding and the plastic. Otherwise the additive concentration in the protective lays significantly due to the extremely high level of migration, causing stabilization to b ineffective. The adhesive properties of the coating decrease, the component is su discoloration and loss of gloss.

The contrasting results achieved through the use of the same HALS in plastic and layer — the clearcoat — are shown in Figure 6. Here, too, a migration process occu specified experimental conditions. However, the concentration profile confirms a s slower migration process. The use of the same additive therefore leads to a reduc

of concentration between plastic and protective layer. The concentration profile pr Figure 6 is also comparable to the profile in multi-layer systems on a metal substreason, greater weathering resistance can also be expected.1

This new process, however, demands close cooperation between the manufacturand the suppliers of plastics. This is because the same stabilizers can only be use consultation. Apart from the increased stability, the laborious process of manufact layer systems can be avoided, considerably reducing production costs. However, cannot be universally applied. Further points also remain troubling such as the cologistic requirements due to the wide spectrum of colors or the realization of meta

Use of "Non-Migrating" HALS

Various possibilities exist for directly preventing the migration of HALS. Oligomer example, are so large that they adhere to the surrounding polymer matrix and mig A further variant is graftable HALS. These are chemically linked directly to the bin are therefore not capable of any migration. Very special perspectives are offered I photo-reactive HALS Sanduvor PR-31.

With this product, the first photo-reactive HALS (see Figure 7) have been develop malonic acid derivative not only exhibits the typical functional groups of the HALS contains a UV absorbing system of conjugated double bonds, which also involves double bond. The latter is split under UV light, causing the loss of the UV absorbing molecule. At the same time, the HALS molecule is chemically attached to the bind preventing migration. The HALS molecule is also fixed in place where the UV rays at the upper surface of the coating. With decreasing strength of the UV rays, the scourse, capable of migrating into the deeper layers of the clearcoat, but can no loss soon as Sanduvor PR-31 has migrated toward the surface, it is photochemically a binding agent through the increased UV radiation. Thus the deeper regions of the have a reservoir effect for the surface and the proportion of HALS molecules fixed region increases with time. Overall, Sanduvor PR-31 guarantees not only lasting the surface area but also excellent value, particularly with components subject to exposure.

Migration Barriers

So-called migration barriers block the migration of the additive. Basecoats and pri a hindering effect, especially when filled with disc-shaped pigments and extender; the solubility of additives in the basecoat binder significantly influences the additive concentration in the top clearcoat and, consequently, the migration capacity. But a layer system leads to a different migration speed.

A higher crosslink density of the polymer matrix may contribute to the reduction of migration speed as well. With increased crosslink density, the gaps in the polymer become smaller, holding back larger additives. This variant is, however, of only lir as excessive crosslink density leads to embrittlement of the coating.

Conclusion

Plastic components are having a determining influence on modern automobile columil be a decisive factor in shaping the car of the future due to their manifold advancesult, the development of efficient and cost-cutting coating systems for this specible becoming increasingly important. The most significant finding is that plastic and proceedings beneficially contain identical stabilizers. The migration process is consider as a result and the expensive application of a multi-layer system becomes unneced However, close cooperation between plastics supplier and coating manufacturer vappreciated.

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